Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

PR 92-151

In the Matter of:	)	
	)	RM- 7839
FEDERAL ACCESS TO LOW POWER	)	
18 GHZ PRIVATE SYSTEMS	)	

PETITION FOR RULEMAKING

Respectfully submitted by:

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October 9, 1991

I. EXECUTIVE SUMMARY

Motorola Inc. requests modification of section 94.17(a)(1) of the rules to allow Federal Government entities to employ low power 18 GHz Digital Termination System (DTS) spectrum as end users operating under licenses issued to private eligibles. Currently, this section of the rules limits shared use and private carrier service offerings on this spectrum to those entities eligible for licensing under Part 94 of the Commission's rules. Federal Government users do not meet this eligibility requirement. Federal entities, however, are already allowed to be end users of private carrier SMRs in the 800 and 900 MHz mobile bands under Part 90 of the rules. Ironically, those bands are significantly more congested than the 18 GHz DTS band.

Motorola has developed and now markets to non-Federal users a very spectrally efficient 18 GHz wireless network that operates under the low power DTS rules. This network connects computing devices in an office, manufacturing, or industrial complex. Motorola's product, called "Altair", provides untethered flexibility and helps users overcome the high costs, delays, and inconvenience encountered in installing, expanding, or changing hard-wired local area networks. In addition, installation and use of wired connections may be impossible or at minimum, could pose a safety hazard, particularly in some industrial operations.

Modification of Section 94.17 as proposed in this petition will provide Federal entities the same opportunity to improve operational efficiency and safety already afforded current Part 94 eligibles. As Federal agencies are tax supported, these operational improvements will benefit the public at large. In addition, the unique spectral efficiency of low power 18 GHz products allows Federal needs to be met without negatively impacting private users.

This rule change will further the objectives of both the Commission and the National Telecommunications and Information Administration (NTIA) to cooperate in making more effective use of the limited radio spectrum. Also, Federal agencies will have the opportunity to meet their wireless in-building network needs with equipment already commercially available, thereby avoiding the delay and added cost incurred in obtaining equipment that otherwise would have to be designed only for the Federal market.

II. BACKGROUND

In its Report and Order in PR Docket 88-191, released March 6, 1990, the Commission modified its rules pertaining to the 18 GHz private digital termination system (DTS) channels. The new rules allow multiple low power transmitters to be operated on these DTS channels at non-specified sites anywhere within a 28 kilometer (17.5 mile) radius of the reference coordinates listed on the license. All private fixed licensees, including those with low power DTS authorizations, may offer service on a shared or private carrier basis under the provisions of Section 94.17 of the rules.

As a result of the Commission's action in PR Docket 88-191, Motorola has developed and now markets very spectrally efficient 18 GHz low power wireless in-building networks that connect computing devices in an office, manufacturing, or industrial complex. This product, called "Altair", provides untethered flexibility and can overcome the high costs, delays, and inconvenience encountered in installing, expanding, or changing hard-wired local area networks. In addition, installation and use of wired connections may be impossible or at minimum, could pose a safety hazard, particularly in some manufacturing or industrial operations. The benefits of such wireless networks are discussed in detail in Section V of this petition.

Motorola is also a license holder in this band. Subsequent to the rule changes, Motorola applied for and was granted low power 18 GHz licenses covering most major metropolitan areas. Altair's low power level, 18 GHz frequency of operation, and antenna design allow substantial frequency reuse throughout the 17.5 mile radius service area covered by each license. Therefore, under the shared use provisions of Section 94.17 of the rules, Motorola makes its licensed channels available for use by its Altair customers. Altair's advanced technology, coupled with Motorola's 18 GHz frequency management operation, allows significant spectrum efficiency while maintaining high quality, reliable service for the user. As an added benefit, the Commission is spared the significant administrative resources required to manage effectively implementation of multiple local area systems on a given channel.

Federal Government entities have expressed interest in Motorola's Altair product. The benefits Altair offers to Part 94 eligibles are equally applicable to the Federal sector. Unfortunately, potential Federal users are prohibited by the current rules from availing themselves of these benefits. As stated above, Federal entities are ineligible even as an end user of a Commission licensed low power 18 GHz system on a shared or private carrier basis. Further, because the 18 GHz DTS band is allocated exclusively for non-government use, potential Federal users could not routinely obtain their own authorization from NTIA.

III. THE RELIEF REQUESTED WOULD NOT ADVERSELY IMPACT PRIVATE USERS

Spectrum reuse, using the same frequency again and again within a relatively short distance, is fundamental to the low power DTS concept. Such reuse on a managed basis is possible because of the low power nature of the systems allowed and the propogation characteristics at 18 GHz. Section 94.88(a) of the rules provides that such systems may not exceed 100 milliwatts transmitter power output and one watt effective isotropic radiated power (EIRP). Propogation characteristics at 18 GHz naturally limit the coverage of such systems. For example, the coverage area of Motorola's Altair 18 GHz system is approximately 5000 square feet.

The low power nature and 18 GHz propogation characteristics allow significant spectrum reuse within the 17.5 mile radius encompassed by a given low power DTS license. Accordingly, a low power licensee could serve both non-Federal and Federal users without reducing the quality of service to either. Therefore, grant of the requested rule changes would have no adverse impact on non-Federal users.

Notably, under the provisions of Section 90.603(c), Federal entities are already allowed to be end users of private carrier SMRs in the 800 and 900 MHz mobile bands. Therefore, adequate precedent exists for the relief Motorola requests. Ironically, this relief already exists in mobile bands that are significantly more congested than the 18 GHz DTS spectrum.

IV. SPECIFIC RULE CHANGE PROPOSED

Only minimal rule changes are required to allow Federal entities to take advantage of new spectrally efficient technologies developed for the private sector. Motorola proposes the Commission modify section 94.17 (a)(1) of the rules to read as shown below.

94.17 Shared use of radio stations and the offering of private carrier communication service.

(a) No change

(1) Licensees authorized radio systems on any of the frequencies set out in sec. 94.61(b) may share such systems with, or provide private carrier service to, any

eligible for licensing under this part, regardless of individual eligibility restrictions enumerated in sec. 94.61(b), provided that the communications carried are permissible under sec. 94.9. In addition, licensees authorized low power systems under the provisions of sec. 94.88 may share such systems with, or provide private carrier services to, Federal Government entities, provided the communications carried are permissible under sec. 94.9.

V. BENEFITS OF 18 GHZ WIRELESS NETWORKS

The benefits wireless local area networks (LANs) can provide are a direct result of the evolution of computers and related wired networks in the office environment. This evolution encompasses the transition from totally centralized computers to totally decentralized units, and then to a network combining the best features of both methods. While such wired networks solve some problems, they create new challenges that must be addressed as well. Buyers of telecommunications and data communications systems increasingly face significant time, cost, and logistical problems associated with the installation, movement, and management of computing and communications equipment in dynamic office and industrial environments. Wireless networks such as Motorola's Altair system bring solutions to these new problems.

The move from mainframe and central information processing of the 1960s and 1970s provided an opportunity for mini-computers to enter the market. It was this transition which provided greater computer and applications access by employees. Throughout the 1980s the declining costs of technology facilitated the distribution of more intelligent

desktop tools such as personal computers. In an effort to empower the worker, organizations provided all types of software and hardware to employees. More importantly, as shown in Figure 1, business use of personal computers is expected to continue growing at an aggressive pace.

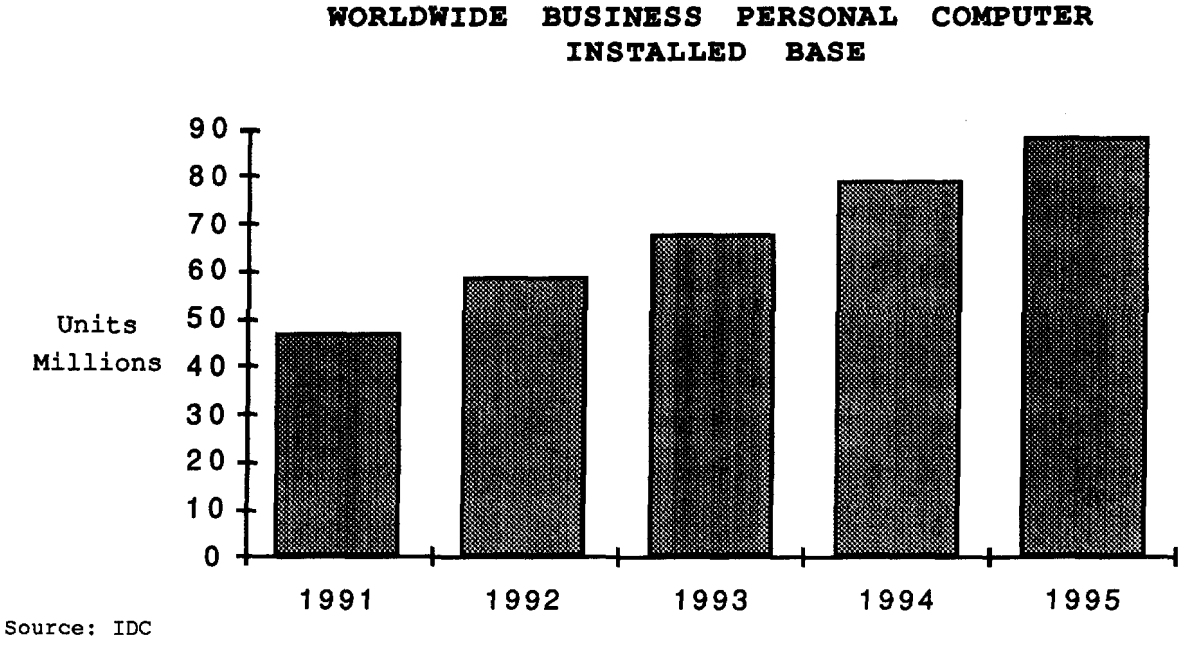
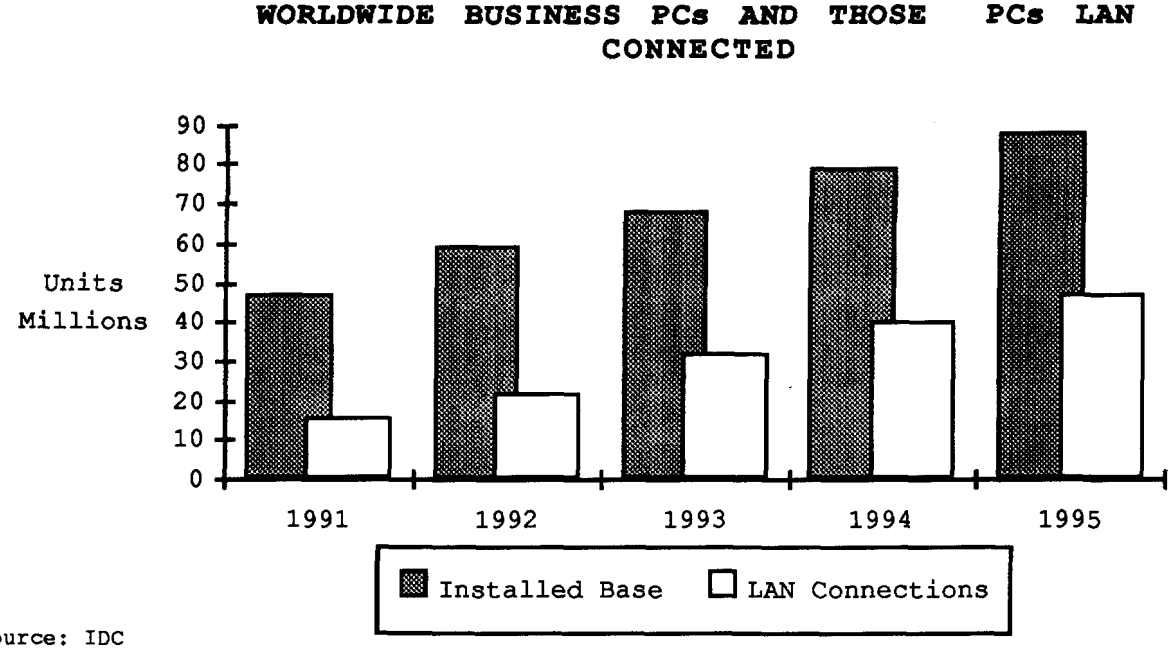


Figure 1

While this growth in desktop computers helped empower employees individually, it hampered the ability of teams of workers to share information. Much of the information storage and manipulation is decentralized on hard disks accesssable only by a given employee. Furthermore, despite the declining costs of personal computers and associated technology, it was and still is considerably expensive to supply each employee with all of the software applications needed. Therefore, the ability to share software applications became desirable. These two

trends have heightened the need to tie together desktop computers with a local area network.

The implementation of LANs throughout the 1980s has been phenomenal and the projected growth throughout the 1990s as shown in Figure 2 is equally impressive. This current and future growth can be attributed to both new installations of LANs and to system segmentations as traffic patterns and throughput requirements dictate.



Source: IDC

Figure 2

Motorola has performed extensive market research to determine the communications needs for the 1990's and specifically to define the requirements for wireless in-building networks. Over 1000 corporate and government entities were surveyed using established marketing research techniques. The results provide insight into business/government

requirements and the areas where current wired networking methods fall short of those requirements.

The increasingly competitive environment demands greater worker mobility, changing assignments and reassignments, changing work groups, and mission mobility. Having information how we want it, when we want it, and where we want it is a strategic and competitive requirement. The need to improve efficiency and the growing need for information will accelerate the adoption of wireless communications.

As each phase of our market investigation was conducted, participants expressed problems with today's wired networks. Whether twisted pair, coax or fiber optic cable, hard wiring for telecommunications and data communications systems within a building environment is expensive and troublesome to install, maintain, and change. Beneath today's increasingly dense electronic office environment lies a tangled, confusing, virtually unmanageable maze of wiring. These wired networks restrict worker mobility. The costs associated with reconfiguring work teams and employee downtime is substantial. This problem inhibits the ability of businesses and governmental entities to improve efficiency and to reduce costs.

A major portion of the cost of initially installing LANs is the cost of interconnecting them, which experts acknowledge can sometimes exceed the cost of computer hardware and software. Labor and material costs for initial wiring are almost always significant, and can reach $1000 per node

just for copper wire. Coax and optical fiber, not surprisingly, are considerably more expensive.

Network reconfigurations are even more costly. A recent study by the Frost and Sullivan[1] group quotes that LAN moves, adds and changes comprise the third largest cost component for LAN installation and hardware maintenance. This study states these reconfigurations account annually for almost $2 Billion of a $12.2 billion LAN maintenance market. This $2 billion does not even include the original cost to install cable.

Estimates of the cost to rewire range from $200 to $1000 per change. A January 1991 study by KPMG Peat Marwick quoted the average relocation cost for just rewiring a LAN station as $300 per node. But those are just the direct costs; hidden costs include significant employee downtime and lost productivity. Our research indicated the need for flexibility and convenience, i.e., reducing these hidden costs and improving productivity, is of more concern than direct cost savings.

Almost 80% of the participants in Motorola's market survey group had some type of relocation or addition of personnel over the last year. The total moves, additions, or changes of respondents ranged from as few as 20% per year up to as much as 200% annually. Furthermore, according

[1]See PC WEEK MAGAZINE, January 1991, Maintenance Costs of LANs Keep Soaring. Source: Frost & Sullivan Inc.

to the KPMG Peat Marwick study, the average company moves its employees approximately 50% annually. Telecommunications consultant Richard Kuehn states that data terminals are moved as often as 1.5 to 3 times per year.

The problems become much more involved when dealing with whole departments and more complex user equipment. Surveyed firms responded that when a relocation takes place, it involves the movement of an entire department over 60 % of the time.

The cost of rewiring rises enormously with the age and complexity of the building. The majority of high-rise office space in large metropolitan areas presents major problems and expense for tenants trying to install, add or move network wiring. Many buildings more than 30 or 40 years old do not readily accommodate communications wiring because older designs and construction techniques did not contemplate todays electronic office. Such buildings are prevalent in the government sector. Furthermore, if asbestos insulation exists in the building, as it does in many pre-health-safety regulated buildings, rewiring costs and associated problems can take on huge proportions.

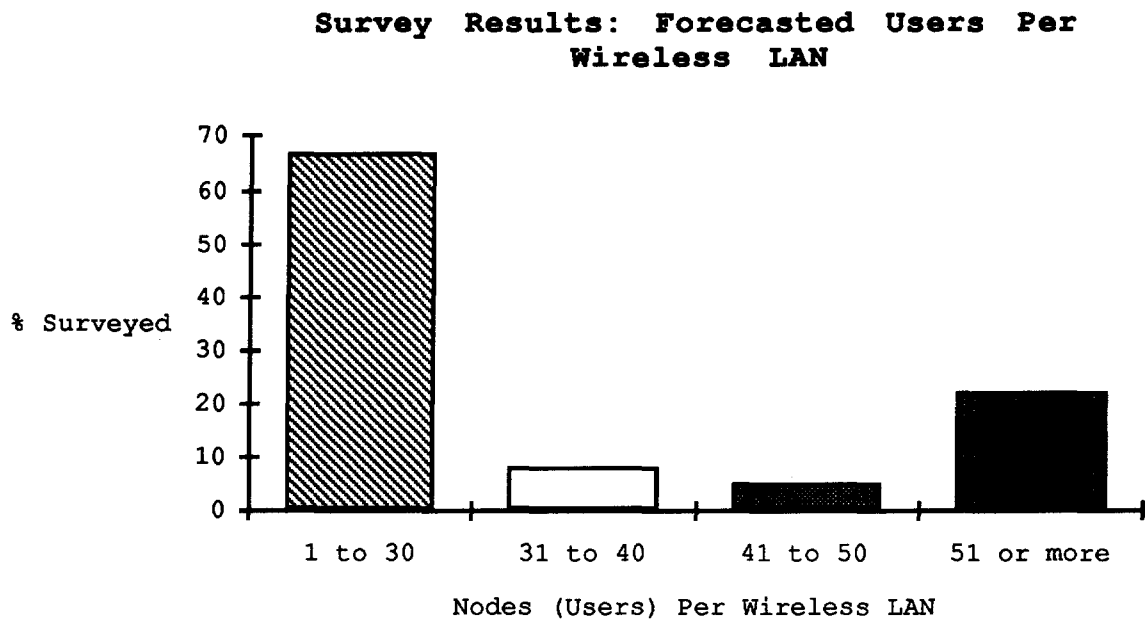
As computing and telecommunications power continues to proliferate and becomes even more widely distributed to the "knowledge worker", the problem will increase. Easy, quick, efficient movement of "people assets" within the working environment is also increasingly being recognized as essential to a business' or government agency's productivity and competitiveness.

Motorola's survey participants indicated the ideal wireless LAN system should have the following attributes:

1) Easy to install and move
2) Easy to operate and virtually transparent to the user
3) Powerful, providing at least 10 Mbps compatibility
4) Secure, absolutely reliable, and cost effective
5) Compatible with existing LAN devices, system software, etc.

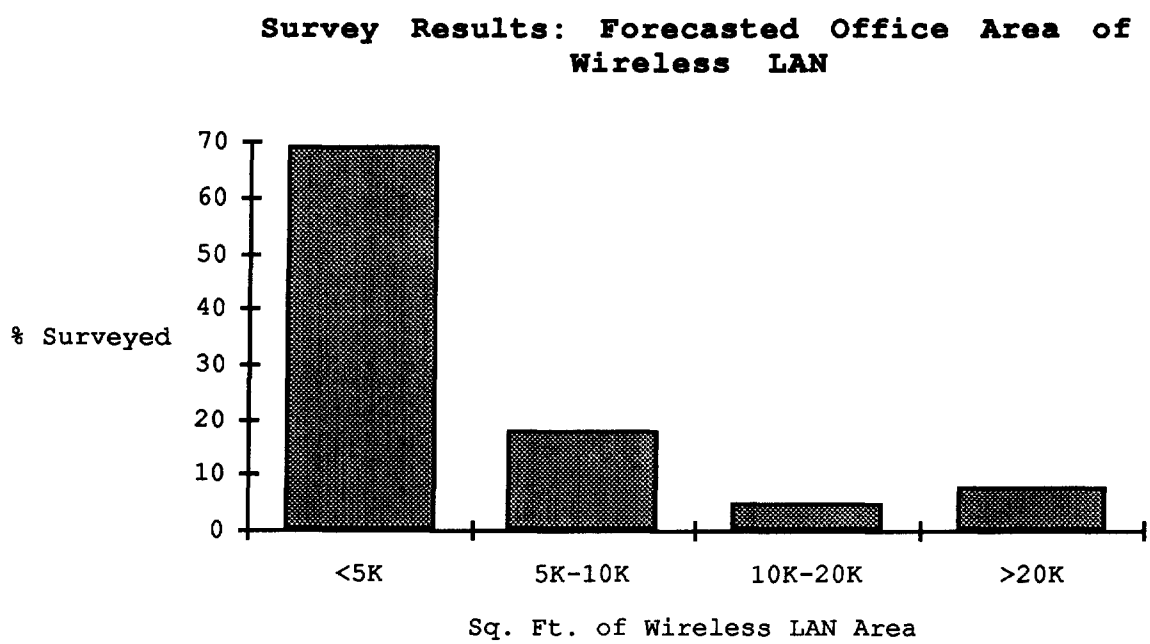
Respondents were asked where a wireless offering might be installed. Survey results as shown on Figure 3 indicate that approximately 70% of the installations would contain fewer than 30 users The average LAN appeared to be in the 12-15 node range. This is further collaborated by the KPMG Peat Marwick study which found that the average LAN size is about 15 users per LAN.

Our survey showed that approximately 70% of LANs would need to cover less than 5000 square feet. The distribution of coverage area requirements expressed by survey respondents is shown in Figure 4.



Source: Motorola Inc.

Figure 3



Source: Motorola Inc.

Figure 4

From a spectrum management perspective, the number of users per wireless LAN and the required coverage area support serving multiple companies and governmental entities by a licensee on a shared/private carrier basis. Doing so allows much more efficient use of the spectrum and obviates the substantial administrative burden that would be required for the Commission or NTIA to provide separately licensed and protected spectrum for such localized service areas.

Finally, while LAN sales are consistent across all industry segments including government, one of Motorola's market studies showed the government sector has the greatest desire for wireless local area network capabilities. The requested rule change would allow government users to meet their requirements for high quality, cost effective wireless local area networks.

VI. SUMMARY

As the penetration of Personal Computers (PCs) nears a one-to-one relationship with phones in the office workplace, the limitations of wired networks will become even more evident. If these problems are not addressed, an organization's flexibility in redeploying "people assets" and ultimately its ability to compete, will be seriously hindered. This requirement is equally applicable to government agencies and private businesses. As tax supported entities, every American citizen benefits when Federal agencies improve efficiency and productivity. Access to spectrum for reliable, cost effective wireless LAN systems can play a significant role in improving efficiency and productivity.

Modifying Section 94.17 of the Commission's rules as requested to allow Federal entities as end users of low power 18 GHz systems on a shared or private carrier basis will make more efficient use of valuable spectrum resources. Furthermore, the low power nature of these systems and the characteristics of the 18 GHz band allow both Federal users to be accommodated without negatively impacting private users.

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